

AMENDMENTS TO THE CLAIMS

The claims in this listing will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A laser imaging apparatus, comprising:

a light source unit that emits a laser beam including a first beam and a second beam, central axes of the first ~~beam~~ and ~~the~~ second beams substantially coinciding with each other, the first beam including non-visible light, the second beam including visible light;

a modulating optical system that modulates the beam emitted by said light source unit, the first beam configured to form an image on the surface to be scanned, the second beam being configured to align the modulating optical system by adjusting a positional relationship of the first beam with respect to the optical axis of the modulating optical system;

a ~~deflecting system~~ deflector that deflects the beam modulated by said modulating optical system, the deflected beam scanning within a predetermined angular range; and

an imaging optical system that converges the deflected beam to form a scanning beam spot on a surface to be scanned.

2. (Canceled)

3. (Currently Amended) The laser imaging apparatus according to claim ~~[[2]]~~ 1, the first beam including light having one or more wavelengths within the non-visible wavelength

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range, the second beam including light having at least one wavelength within the visible wavelength range.

4. (Currently Amended) The laser imaging apparatus according to claim [[2]] 1, wherein said light source unit includes:

a first laser source that emits the first beam;

a second laser source that emits the second beam; and

a beam combining optical system that combines the first beam and second beam such that the central axes of the first beam and the second beam coincide with each other.

5. (Original) The laser imaging apparatus according to claim 4, wherein one of the first beam and the second beam is emitted from said light source unit as a P-polarized beam and the other of the first beam and the second beam is emitted from said light source unit as an S-polarized beam, and wherein said beam combining optical system includes a polarized beam combiner that receives the P-polarized beam and the S-polarized beam and combines the received beams such that the central axes of the first beam and the second beam coincide with each other.

6. (Original) The laser imaging apparatus according to claim 5, wherein said second laser source includes:

a laser diode that emits a laser beam having a visible wavelength; and

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a collimating lens that collimates the laser beam emitted by said laser diode, the collimated beam being the second beam.

7. (Currently Amended) The laser imaging apparatus according to claim [[2]] 1, wherein said light source unit includes:

an excitation light source that emits the second beam, which serves as an excitation beam, having a visible wavelength;

a laser medium that is excited by the excitation beam to emit the first beam; and

a switching system that switches optical paths of the laser beam emitted by said excitation light source such that the laser beam emitted by said excitation light source is emitted from said light source unit or ~~the laser beam emitted by said excitation light source~~ is incident on said laser medium, the first beam being emitted by said laser medium in response to ~~incident~~ incidence of the excitation beam on said laser medium.

8. (Original) The laser imaging apparatus according to claim 1, wherein only the first beam is directed from said light source unit to said modulating optical system when imaging is performed, and wherein only the second beam is directed from said light source unit to said modulating optical system when alignment is performed.

9. (Original) The laser imaging apparatus according to claim 1, further including a filtering system provided between said light source unit and said modulating optical system, said filtering system selectively transmits one of the first beam and the second beam.

10. (Original) The laser imaging apparatus according to claim 9, wherein said filtering system includes a filtering optical element formed with a first area that transmits only the non-visible light and a second area that transmits only the visible light, said filtering optical element being movable between a first position and a second position, said first area being inserted in an optical path between said light source unit and said modulating optical system when said filtering optical element is located at said first position, said second area being inserted in the optical path between said light source unit and said modulating optical system when said filtering optical element is located at said second position.

11. (Currently Amended) The laser imaging apparatus according to claim 4, wherein said first laser source and said second laser source are selectively actuated so that one of the first beam and the second beam is emitted at a time.

12. (Currently Amended) The laser imaging apparatus according to claim [[2]] 1, further comprising a beam separating optical system that separates the first beam from the second beam so that only the first beam is incident on the surface to be scanned.

13. (Original) The laser imaging apparatus according to claim 12, wherein said beam separating optical system is provided on a downstream side of said modulating optical system and on an upstream side of the surface to be scanned.

14. (Currently Amended) The laser imaging apparatus according to claim 12, wherein said beam separating optical system includes a ~~dychroic~~ dichroic mirror.

15. (Original) The laser imaging apparatus according to claim 1, wherein said modulating optical system includes:

a reduction optical system that reduces a diameter of a beam incident thereon;

a modulator that ON-OFF modulates an incident beam in accordance with an image pattern to be formed on the surface to be scanned; and

a collimating lens that collimates the beam modulated by said modulator.

16. (Original) The laser imaging apparatus according to claim 15, wherein said modulator includes an acousto-optical modulator.

17. (Currently Amended) The laser imaging apparatus according to claim 1, a chromatic aberration of said modulating optical system in respect to the first beam and the second beam is compensated for.

18. (Original) The laser imaging apparatus according to claim 1, wherein the non-visible light is ultraviolet light.

19. (Original) The laser imaging apparatus according to claim 1, wherein said light source unit includes a filter that reduces the intensity of visible light.

20. (New) A laser imaging apparatus, comprising:

a light source unit that emits a laser beam including a first beam and a second beam, central axes of the first and second beams substantially coinciding with each other, the first beam including non-visible light, the second beam including visible light;

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a modulating optical system that modulates the beam emitted by said light source unit;  
a deflector that deflects the beam modulated by said modulating optical system, the deflected beam scanning within a predetermined angular range;

an imaging optical system that converges the deflected beam to form a scanning beam spot on a surface to be scanned,

wherein said light source unit includes:

an excitation light source that emits the second beam, which serves as an excitation beam, having a visible wavelength;

a laser medium that is excited by the excitation beam to emit the first beam; and

a switching system that switches optical paths of the laser beam emitted by said excitation light source such that the laser beam emitted by said excitation light source is emitted from said light source unit or is incident on said laser medium, the first beam being emitted by said laser medium in response to incidence of the excitation beam on said laser medium.

21. (New) A laser imaging apparatus, comprising:

a light source unit that emits a laser beam including a first beam and a second beam, central axes of the first and second beams substantially coinciding with each other, the first beam including non-visible light, the second beam including visible light;

a modulating optical system that modulates the beam emitted by said light source unit;

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a deflector that deflects the beam modulated by said modulating optical system, the deflected beam scanning within a predetermined angular range; and

an imaging optical system that converges the deflected beam to form a scanning beam spot on a surface to be scanned,

wherein only the first beam is directed from said light source unit to said modulating optical system when imaging is performed, and wherein only the second beam is directed from said light source unit to said modulating optical system when alignment is performed.

22. (New) A laser imaging apparatus, comprising:

a light source unit that emits a laser beam including a first beam and a second beam, central axes of the first and second beams substantially coinciding with each other, the first beam including non-visible light, the second beam including visible light;

a modulating optical system that modulates the beam emitted by said light source unit;

a deflector that deflects the beam modulated by said modulating optical system, the deflected beam scanning within a predetermined angular range;

an imaging optical system that converges the deflected beam to form a scanning beam spot on a surface to be scanned; and

a filtering system provided between said light source unit and said modulating optical system, said filtering system selectively transmits one of the first beam and the second beam,

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wherein said filtering system includes a filtering optical element with a first area that transmits only the non-visible light and a second area that transmits only the visible light, said filtering optical element being movable between a first position and a second position, said first area being inserted in an optical path between said light source unit and said modulating optical system when said filtering optical element is located at said first position, said second area being inserted in the optical path between said light source unit and said modulating optical system when said filtering optical element is located at said second position.

23. (New) A laser imaging apparatus, comprising:

a light source unit that emits a laser beam including a first beam and a second beam, central axes of the first and second beams substantially coinciding with each other, the first beam including non-visible light, the second beam including visible light;

a modulating optical system that modulates the beam emitted by said light source unit, the first beam being configured to form an image on the surface to be scanned, the second beam being configured to align the modulating optical system by adjusting a positional relationship of the first beam with respect to the optical axis of the modulating optical system;

a deflector that deflects the beam modulated by said modulating optical system, the deflected beam scanning within a predetermined angular range; and



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an imaging optical system that converges the deflected beam to form a scanning beam spot on a surface to be scanned,

wherein said light source unit includes:

a first laser source that emits the first beam;

a second laser source that emits the second beam; and

a beam combining optical system that combines the first beam and second beam such that the central axes of the first beam and the second beam coincide with each other,

wherein said first laser source and said second laser source are selectively actuated so that one of the first beam and the second beam is emitted.